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NEOPILINA GOESI, A NEW CARIBBEAN MONOPLACOPHORAN MOLLUSK DREDGED IN 1869

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Abstract.—A new monoplacophoran species, *Neopilina goesi,* dredged NW of the Virgin Islands, from the upper part of the continental slope, is described. This new species resembles *N. oligotropha* Rokop and *N. zografi* (Dautzenberg & Fischer), but has a more marginal apex than the former and a finer sculpture than the latter species.

Axel Theodor Goës (1835–1897) was a Swedish physician and zoologist whose main zoological interest was Foraminifera. During 1862–1870 he was employed at the garrison at St. Barthelemy, Leeward Islands, then a Swedish colony. In 1866 and 1869 Goës dredged around St. Barthelemy at depths down to 400 fathoms (720 m). This yielded rich material of different groups of animals. A very brief description of the dredgings was given by Goës (1882:8). These collections were given to the Swedish Museum of Natural History in 1870 (Theel 1916:205) and formed the base for several reports on Caribbean invertebrates. The molluscs, however, were only roughly sorted to species by N. Odhner and never published upon, although he labelled many species with manuscript names. A considerable part of the molluscan species collected by Goës is undescribed and will probably remain so until better material becomes available, because most of it consists of broken juveniles extracted from shell gravel. The monoplacophoran, here described as a new species, had been labelled "*Acmea sp.,*" by Odhner, an irony of fate, as it was Odhner who named the class Monoplacophora (*in* Wenz 1940; not Wenz *in* Knight 1952, as often is quoted).

Neopilina Lemche, 1957
Neopilina goesi, new species
Figs. 1–3, 6–11

Type material.—Holotype, Swedish Museum of Natural History type collection no. 3635a, the shell figured in Figs. 2, 6, 7. Paratype, type collection no. 3635b, the shell figured in Figs. 1, 3, 8–11.

Type locality.—"Windward off the eastern keys of the Virgin Islands, 200–300 fathoms (360–540 m)," upper continental slope of the western Caribbean.

Distribution.—Known only from the type locality and type material.

Description.—Shell very small, colorless, fragile, regularly ovate and depressed, with apex reaching slightly outside margin. Apical region consisting of central part without sculpture, but rather rough and with signs of wear, 0.13 × 0.16 mm (Figs. 3, 6); surrounded by smooth area, diameter 0.3 mm, sculptured only by numerous pores or pits and 2 or 3 incomplete anterior concentric ridges. Outside this area more regular sculpture of concentric and radial ridges starting, giving surface distinctly reticulated appearance, with distinct tubercules at intersections of concentric and radial ridges. Concentric ridges somewhat more close-set and irregular at edge of shell, but very regular at central part of shell. Shell interior very smooth with no muscle scars visible and only some traces of radial sculpture apparent by transparency. Shape regularly convex with apex distinctly overhanging anterior ventral margin.

Dimensions: Holotype 1.79 × 1.40 × 0.56 mm. Paratype 1.54 × 1.21 × 0.46 mm.

Remarks.—The two specimens are smaller than the maximum dimensions known for any other monoplacophoran species (smallest species: *Laevipilina hyalina* (McLean, 1979), 2.28 mm), but the more crowded concentric radial sculpture at the edge indicates that the specimens are approaching full-grown size.

The inside of the shell does not show any muscle scars, although the condition of the shell is good enough to have shown them if they had been present. This agrees with other recent monoplacophorans (Wingstrand 1985:47). The reason for considering this limpet a monoplacophoran is the similarity in shell characters to *N. oligotropha* Rokop, 1972, and *N. zografi* (Dautzenberg & Fischer, 1896), which from anatomy and shell structure, respectively, are known to belong to this group.

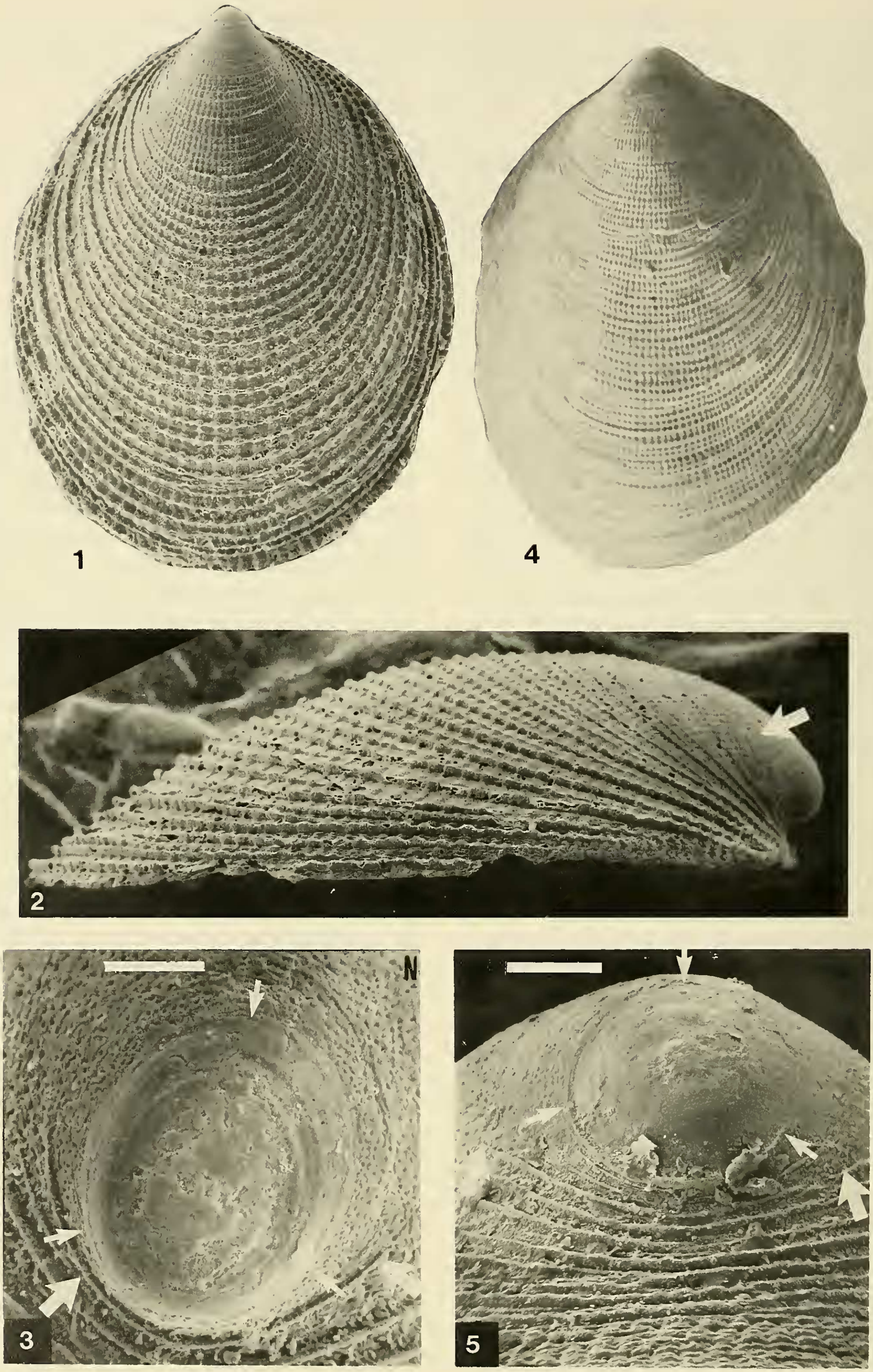
A part of the shell is covered by tracks or shallow furrows about 1 μm wide, similar to those made by beetles under the bark of trees (Figs. 9–10). These furrows occur on the area equipped with pores and on the early part of the area with adult sculpture. They appear to be too regular to be caused by corrosion, but their origin is unknown.

The presence of three different sculptural areas on the shell, in accordance with the growth lines, indicates that *N. goesi* passes through three different ontogenetic growth stages in its life history. I cannot, however, presently correlate these with the different phases in the shell development of gastropods or lamellibranchs with planktotrophic larvae. Nor is it possible to conclude that the bowl-shaped initial part which lacks pores is a larval shell although this seems possible. Wingstrand (1985) concluded that the old description by Lemche & Wingstrand (1959) of a spirally coiled larval shell was erroneous. He supported this on a report by Menzies (1968) where a young mollusc supposed to be a monoplacophoran was figured with a large bulbous larval shell. However, the identification of Menzies's specimen may be questioned. It closely resembles the young of many Lepetellacea Dall, 1881 (Archaeogastropoda), but his photo indistinctly shows a prismatic structure of the shell, not present in Lepetellacea. Wingstrand concluded that it probably represented a monoplacophoran and that this larval shell is later rejected, possibly as in *Patella* (Linné, 1758). Menzies's figure is, however, too poor to allow any conclusions about whether the larval shell is spirally coiled as in the Docoglossa, where it consists of half a whorl, or simply bowl-shaped as assumed by Wingstrand.

I have seen the process of larval shell rejection in *Patella coerulea* (Linné, 1758) (Figs. 12–14). Here a narrow zone around the larval and part of the first postlarval shell is dissolved, evidently actively (Warén unpubl. data, see also Gardner 1986), after which the larval shell falls off at the slightest touch. The place where the larval shell has been attached is marked by a distinct scar with a large pore, now closed. These observations agree with Smith's (1935) description of the larval development of *Patella*, based on sectioned material. His fig. 29b shows a small apical chamber, cut off from the main part of the body by a septum and connected to the body by a narrow string of tissue. Behind the scar is a second impression from the overhanging part of the larval shell. A very similar mode of rejection of the larval shell has also been observed in the Lepetellidae (Warén, unpubl. data).

The absence of a pronounced scar from the larval shell (compare Figs. 3, 5 and 14), the shape of the apex, and the presence of three well-marked apical zones seem to argue against Wingstrand's hypothesis about rejection of the larval shell, but it is possible that there occur different modes of larval development among monoplacophorans.

Pores like those obvious in Figs. 6–9 have not previously been reported from any recent monoplacophoran. I have, however, seen them also in *N. zografi*, although they are less obvious in that species, probably because the shells available of *N. zografi* were less well preserved. These pores are most numerous in the smooth area around the scar of the protoconch, but occur less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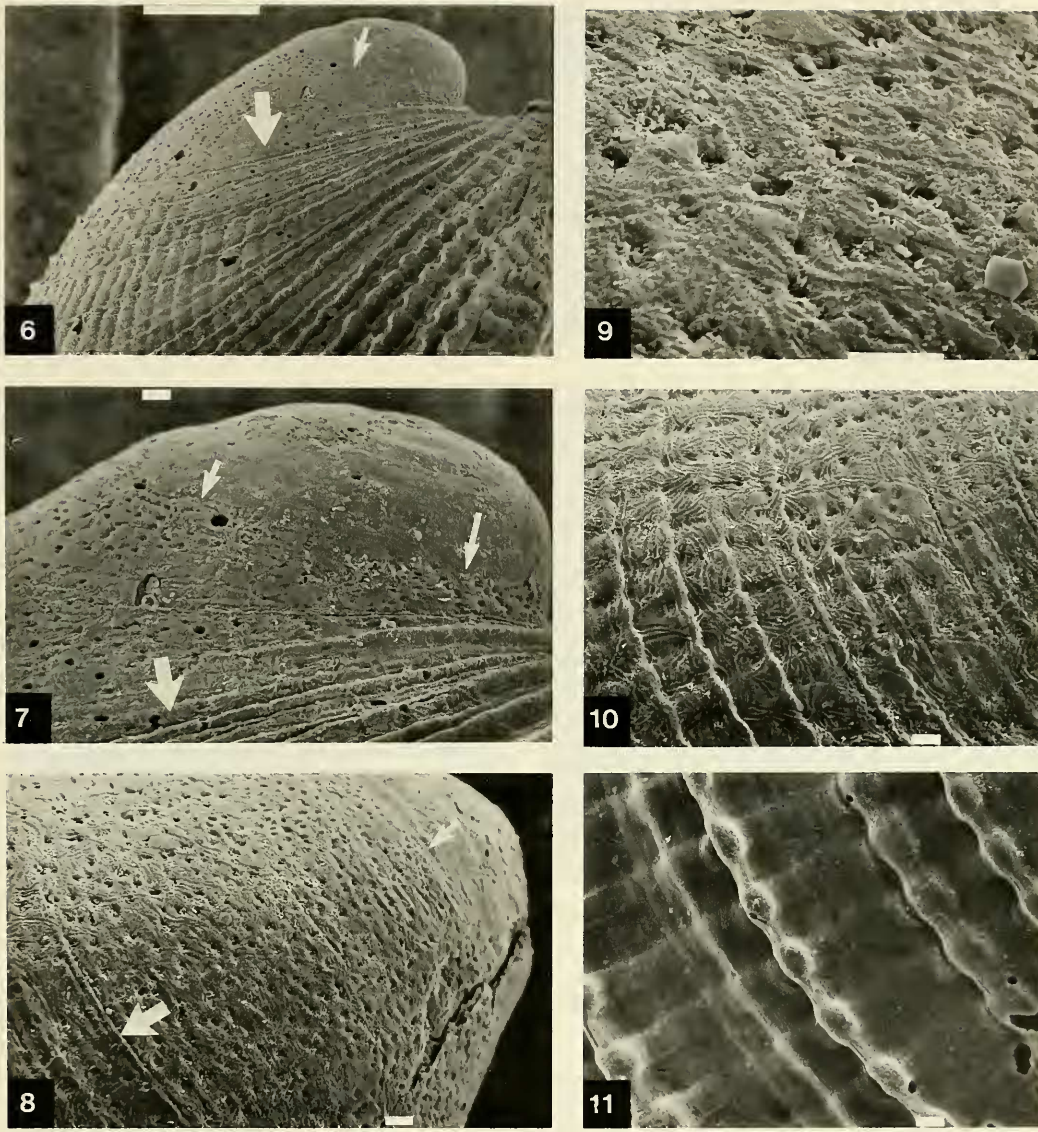

Figs. 6–11. *Neopilina goesi,* details of sculpture: 6, 7, Apical area of holotype, side view, showing bowl-shaped apex; 8, Apical area of paratype, showing distribution of pores; 9, Detail of pores; 10, Transition from part with pores to adult sculpture; 11, Adult sculpture on central part of shell. Scale lines: Fig. 6, 100 μm; Figs. 7–11, 10 μm. Arrows indicate transition between different sculptural zones.

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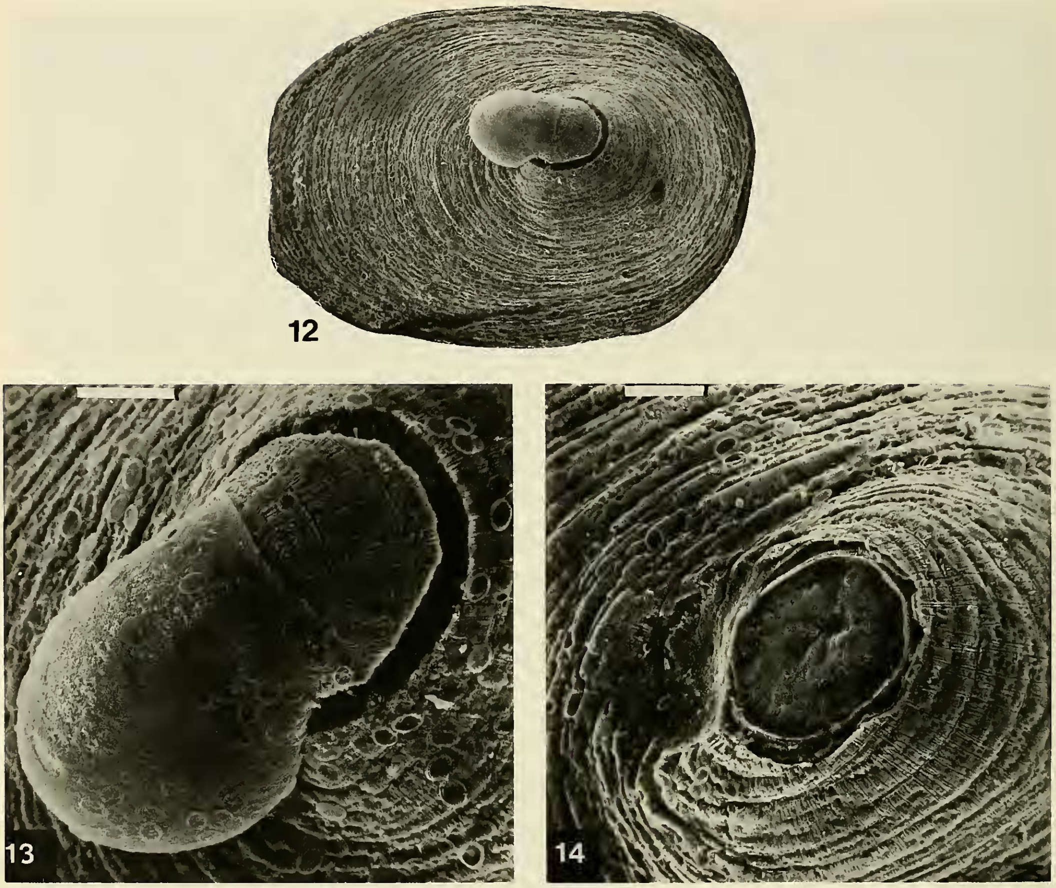
Figs. 1–5. *Neopilina goesi* and *N. zografi*: 1, *N. goesi,* paratype, maximum diameter 1.54 mm; 2, *N. goesi,* holotype, lateral view, length 1.79 mm; 3, *N. goesi,* paratype, apical area; 4, *N. zografi,* paratype, in Muséum National d'Histoire Naturelle, Paris, maximum diameter 3.9 mm; 5, *N. zografi,* apical area of specimen in Fig. 4. Scale lines 50 μm. Arrows indicate the different sculptural zones.



Figs. 12–14. *Patella coerulea* (L.), from Calvi, Corsica, taken at the pier of Station de Recherche Sousmarines et Océanographiques: 12, Juvenile shell, diameter 0.8 mm; 13, Larval shell (smooth) and part of initial teleconch ready to fall off; 14, Larval shell lost. In the center of the calcareous plug that seals off apex, a closed pore can be seen. This pore is the last connection to the larval shell and may in some way assist in the active dissolution of the zone of breakage. Scale lines: Fig. 13, 30 μm, Fig. 14, 20 μm.

densely all over the shell. I did not study them in detail and their significance is not known. Pores are known in the Silurian genus *Tryblidium* Lindström, 1880 (Erben et al. 1968). In that genus they branch inwards, something that could not be examined in *N. goesi* because of lack of material.

There are two known species of Monoplacophora that resemble *N. goesi* in shell morphology, viz. *N. zografi,* from the bathyal zone of the Azores, and *N. oligotropha,* from abyssal depths north of the Hawaiian Islands.

Neopilina oligotropha differs from *N. goesi* in having the apex placed well behind the anterior margin of the shell. Other differences are impossible to discern because of the poor illustrations of that species, except that *N. oligotropha* evidently has a coarser sculpture; *N. goesi* has 28 concentric ridges behind the apex at a size of 1.79 mm, while *N. oligotropha* has 32 at a size of 3.0 mm.

Neopilina zografi differs mainly in having a blunter apex, the sides of which form a wider angle in dorsal view and perhaps also by reaching a larger size, 3.9 mm.

The systematic position of *N. goesi* within Monoplacophora is uncertain, as no soft parts are known. From the shell, it is obvious that it does not belong to *Laevipilina* McLean, 1979, whose species have a rather smooth shell, with a low but dense nodular sculpture, caused by the large prisms that build up the shell. Prisms are also obvious in *Vema* Clarke & Menzies, 1959, where *Laevipilina* was described as a subgenus. *Monoplacophorus* Moskalev, Starobogatov, & Filatova, 1983, may be related to the present new species, but the description of the shell and the illustrations do not allow any conclusions. Therefore, I have followed Rokop (1972) and Bouchet, McLean, & Warén (1983) and included this small, strongly sculptured species in *Neopilina*.

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